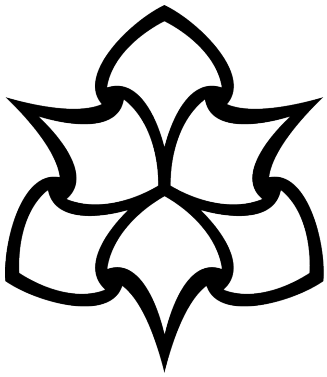

Linkage analysis as evidence in court: a thematic analysis of mock juror deliberations

Key words: linkage analysis; expert testimony; jury decision making; lay theories; crime scene behaviour

Abstract

Linkage analysis has, albeit occasionally, been presented in courts across the world as evidence that a series of offences possess behavioural similarities and distinctiveness from other offences, meaning they are likely to have been committed by the same individual. It is therefore imperative to ascertain how linkage analysis is regarded by juries within the context of deliberations. Three groups of participants ($N = 22$) eligible for jury duty in England and Wales viewed a simulated rape and murder trial derived from *State v. Sukude* (2006). Linkage analysis formed the sole evidence against the defendant in the two later offences, although DNA matches and eyewitness identifications of the defendant were present in the two earlier offences. Participant deliberations were recorded and subjected to thematic analysis. Five themes were discovered; behavioural consistencies and inconsistencies, physical v case linkage evidence, barriers to admissibility, potential uses of linkage analysis and dependence of lay knowledge. Jurors' over-reliance on erroneous lay knowledge contributed to their conclusion that linkage analysis is, at present, unrepresentative evidence that cannot independently indicate a defendant's culpability. However, participants believed that linkage analysis could be a useful tool within investigations and, with further research evidence, in court in England and Wales.

Key words: linkage analysis; expert testimony; jury decision making; lay theories; crime scene behaviour

Linkage analysis as evidence in court

Despite the fact that a significant proportion of jury deliberations are concerned with the evidence at hand (Devine, Clayton, Dunford, Seying, & Pryce, 2000), there is a lack of research addressing the effect of various forms of scientific material upon juror decision making. Research illustrates that physical evidence, particularly DNA evidence, is perceived by jurors as superior to person evidence (Lieberman, Carrell, Miethe, & Kraus, 2008). Jurors appear unaware of the potential for errors in DNA evidence, despite the acceptance within the scientific community of potential human error during the process of collection, analysis and interpretation (Lieberman et al., 2008). In fact, perceptions of DNA accuracy and persuasiveness have been found to reach 95% and 94% respectively (Lieberman et al., 2008).

DNA evidence appears to be the most persuasive physical evidence as it is commonly considered in 'television shows, high profile news stories and DNA exonerations' (Lieberman et al., 2008, p. 142). In fact, Lieberman et al. found that participants expected some form of scientific evidence to be present in 73% of rape cases, 46% of murder cases and 46% of criminal trials overall. The Crime Scene Investigation (CSI) effect states that individuals have unrealistically positive views regarding the accuracy and availability of scientific forensic evidence due to the prevalence in mainstream popular culture of crime-based television programmes, such as the American series *CSI: Crime Scene Investigation*, demonstrating advanced (and often fictional) scientific techniques (Tyler, 2006). This is despite the potential human error during the process of collection, analysis and interpretation noted within the scientific community (Lieberman et al., 2008). Lieberman et al. concluded that, the mere presence of physical scientific evidence may lead jurors to perceive defendants as guilty. This explains why Devine et al. (2001) concluded that whilst circumstantial evidence may be useful in demonstrating that elements of the offence occurred, jurors require additional evidence to ascertain culpability, particularly that of scientific evidence. However,

there is limited empirical research to determine whether linkage analysis is viewed as scientific evidence, and how it influences juror deliberations in comparison to other forms of evidence.

Linkage analysis (synonymously referred to as case linkage or comparative case analysis) 'is a process that aims to identify crimes that are likely to have been committed by the same suspect because of the behavioural similarity evident across the crimes' (Woodhams, Bull, & Hollin, 2007, p. 118). It is a form of behavioural analysis that is typically utilised in instances of serious serial murders in which there is an absence of physical evidence to identify the (usually unknown) offender. Linkage analysis is grounded in psychology and is based upon the theoretical assumptions of behavioural consistency and behavioural variability (Woodhams, Hollin, & Bull, 2007). Behavioural consistency is derived from Canter's (1995) offender consistency hypothesis, in which it is assumed that the behaviour exhibited by a single offender will be constant across their offences. Alison, Bennell, Mokros, and Ormerod (2002) state that certain behavioural features will be repeated across a series of (the same category of) crimes and can therefore be indicative of a particular individual being responsible. Thus, '. . . the behaviours that are requisite to a particular offender successfully perpetrating a crime' (Hazelwood & Warren, 2004, p. 308), known as *modus operandi* behaviours, will be present at a crime scene.

In support of the concept of behavioural consistency, Salfati and Bateman (2005) demonstrated that serial murders could be classified thematically, according to manifestations of aggression. Similarly, and perhaps of greater noteworthiness, Santtila et al. (2008) identified that when linking crimes according to offence and victim characteristics (particularly those of control and impulsiveness), 63% of crimes could be apportioned to the correct series to which they belonged (by far exceeding the level of chance).

Behavioural variability is the assumption that individuals exhibit distinctive behaviours in their offences that are indicative of a single offender (Woodhams, Bull, & Hollin, 2007). However, it should be recognised that the context in which individual offences occur may constrain offender behaviour therefore preventing distinctive behaviours being exhibited in all of an individual's offences. Similarly, purely due to chance, apparently distinctive behaviours may actually be exhibited by multiple offenders. However, Santtila, Junkkila, and Sandnabba (2005) noted that analysis of crime scene behaviours could be used to successfully distinguish between perpetrators of serial stranger rapes thus supporting the concept of behavioural variability. Woodhams, Hollin, and Bull (2007) state that behavioural variability stems from the fact that the distinct personality possessed by every offender manifests differently within similar offence settings. These so called *signature behaviours* (Hazelwood & Warren, 2004) are the 'calling card of an offender…used to describe a unique combination of behaviours that emerges across two or more offences' (p. 311). To conclude, research examining linkage analysis is still developing and limitations are present in the existing studies on this topic. Nonetheless, linkage analysis is based on the logical and generally supported assumption that offenders are generally consistent, yet distinctive, in their behaviour across an offence series (particularly in instances of rape and murder).

Linkage analysis in court in England and Wales

Woodhams, Bull, and Hollin (2007) state that although linkage analysis is primarily implemented in police investigations of serial crimes, through either the proactive or reactive searching of similar offences, it has the potential to be utilised as evidence in legal proceedings in England and Wales. Similar fact evidence is presented as character evidence in order 'to show that the defendant was likely to be guilty of whatever was currently alleged against him' (Allen, 2008, p. 319). Ormerod and Sturman (2005) note that linkage analysis could be presented as similar fact evidence in instances where the defendant has previous

convictions for similar offences. However, expert testimony on case linkage is likely to be more often presented to suggest that the offence/s in question have been committed by the same individual based upon their consistent, yet distinct, behavioural characteristics. Such evidence may be of particular importance in instances where there is evidence to indicate culpability (for instance, DNA and/or identification) for some, but not all, of the offences in question (Labuschagne, 2012). Ormerod and Sturman (2005) conclude that linkage analysis may be of great assistance to the jury when determining if and how crimes are related to one another, and may be pivotal in deciding whether the same individual is responsible for similar offences.

Ormerod and Sturman (2005) state that linkage evidence must be considered legally relevant before it can be admitted into court. Although evidential material presented during the course of legal proceedings in England and Wales is not required to meet the Daubert criteria (as necessary in the United States), Woodhams, Bull, and Hollin (2007) specify that expert evidence must have 'general acceptance within the scientific community' (p. 129). Ormerod and Sturman (2005) suggest that, in order for linkage analysis to be admissible, it must be verified that it is derived from a sound theoretical basis. In addition, in order to avoid usurping the role of the jury, such evidence should be used to demonstrate offence similarity rather than direct evidence of the defendant's culpability. Ormerod and Sturman (2005) conclude that if these principles are satisfied case linkage has the potential to assist the jury in their decision making processes. However, it should be noted that even if linkage analysis satisfies the fundamental judicial principles discussed above, it may be rejected if the evidence is perceived to be within the knowledge and understanding of a layperson (Woodhams, Bull, & Hollin, 2007). Thus, it must be established whether offence similarities are identifiable by a juror with little or no understanding of criminal behaviour, or whether

expert witnesses are required to highlight the commonality and rarity of the offence behavioural characteristics.

To date, linkage evidence has been admitted in legal proceedings in England and Wales only once (R v Straffen, 1950) but case linkage has developed considerably since this time. More recently, expert evidence on case linkage has been permitted in the United States (*State v. Fortin*, 2000) and South Africa (*State v. Sukude*, 2006; *State v. Mogale*, 2011). In the case of *State v. Fortin* (2000), Robert Hazelwood testified as to the similarities evident in the two murders in question, citing fifteen modus operandi behaviours and five signature behaviours (Hazelwood & Warren, 2004) evident across both crimes. He concluded that, in his professional opinion, the combination of such behaviours was so unique that the same individual was responsible for the offence series. However, the acceptance of this evidence was later overturned in *State v. Fortin* (2004) and *State v. Fortin* (2007), citing the fact that Hazelwood's testimony did not derive from a reliable database of similar cases, and that some of the characteristics evident within the offences were not classified as unique signature behaviours. Nevertheless, in the South African cases of *State v. Sukude* (2006) and *State v. Mogale* (2011), linkage analysis was successfully utilised in the conviction of those responsible (albeit only by judges, due to the absence of a jury within that particular judicial system). In both instances the expert witness, Gerard Labuschagne, compiled an extensive report that detailed the similarities evident across the crimes which referenced empirical research and statistics. In the case of Mogale (*State v. Mogale*, 2011, Judgement) the judge concluded that the linkage analysis presented 'has been of immense help to this court' (p. 83) and that 'similar fact evidence was thus relevant' (p. 68).

Linkage analysis in jury decision making

Despite its prior use in adversarial criminal justice systems, and Ormerod and Sturman's (2005) conclusion that linkage analysis has the potential to be admissible in court,

there remains little empirical research addressing juror's utilisation of linkage evidence. Paclebar, Myers, and Brineman (2007) examined whether American mock jurors (as opposed to juries) would be influenced by criminal profiling testimony (linkage analysis). Their study found no significant effect of linkage evidence upon mock juror estimates of defendant culpability and dangerousness. Furthermore, despite mock jurors rating it as moderately influential in their decisions, linkage analysis was rated as less persuasive than medical, eyewitness and psychological testimony. The authors therefore concluded that mock jurors were reluctant to utilise linkage analysis in their judgements and such evidence was consequently not of any particular influence in real life juror decision making (Paclebar et al., 2007).

The methodology utilised by Paclebar et al. (2007) did not explain why participants were disinclined to utilise linkage evidence. Thus, Charron and Woodhams (2010) implemented a qualitative analysis of mock jury deliberations in England in order to consider 'how jurors understand and use linkage analysis evidence' (p. 172). Participants were presented with a simulated criminal trial in which a prosecution expert introducing linkage analysis, and a defence expert disputing the admittance of such evidence was the only material evidence. Whilst jurors extensively discussed the similarities and dissimilarities evident across the two offences (thus demonstrating an understanding of the purpose of such evidence), they frequently questioned the reliability of linkage analysis and questioned 'How rare are these combinations, how rare are these elements that were stated as unique? What combination's unique? How rare are these characteristics? I am disappointed that there weren't statistics provided with these that told me how to weight them.' (P3[1]10:30, Charron & Woodhams, 2010, p. 177).

Charron and Woodhams' participants therefore suggested that, in order for such evidence to be accepted by jurors, linkage analysis should be complemented by research

and/or statistics. Nonetheless, participants frequently relied upon their lay knowledge regarding the perceived commonality of criminal behaviours, perhaps due to misconceptions surrounding offender behaviour in sexual offences (as noted by the authors). Unsurprisingly, all juries reached an innocence verdict. Charron and Woodhams concluded that, in order to more accurately understand jury deliberation and subsequent decision making, future empirical research must present linkage analysis within the context of realistic legal proceedings (that is, accompanied by additional evidential material).

The Present Study

To date there is limited empirical research on the impact of linkage analysis evidence on jury decision making. The existing research (Charron & Woodhams, 2010; Paclebar, et al., 2007) indicates that there is, at best, disinclination towards utilising linkage analysis evidence in deliberations and judgements. However, previous research is hindered by the use of overly simplistic written case summaries (Paclebar et al., 2007) and overly specific linkage analysis presented in isolation from other evidential material (Charron & Woodhams, 2010). Both Charron and Woodhams and Paclebar et al., acknowledge the need for future empirical research utilising more sophisticated case materials embedded within the context of representative judicial proceedings. Consequently, the aim of the present study was, through the implementation of a mock trial paradigm, to understand how juries regard linkage analysis as evidential material within the context of deliberations. In order to address the methodological weakness of prior research, the current study used a film of a simulated serial murder trial (closely based on the South African case of *State v. Sukude*, 2006) which featured 'traditional' evidential material for the initial offences, yet relied solely upon linkage analysis evidence in the final offences. Thus, the research addresses the question; how do mock jurors perceive linkage analysis evidence?

Method

Design

A qualitative methodology was implemented, in which thematic analysis was conducted to 'identify, analyse and report patterns evident within the data' (Braun & Clarke, 2006, p. 79), in order to account for how linkage analysis is regarded by mock juries during the course of deliberations. Specifically, an inductive (or data-driven) thematic analysis was conducted, in which codes and subsequent themes were directly derived from the raw data itself (Boyatzis, 1998). As thematic analysis provides a rich description of the predominant themes across the entire data set (Braun & Clarke, 2006) it is an approach suited to topics lacking in empirical research, such as linkage analysis.

The epistemology of the current research is that of an essentialist, or realist, framework in which the focus was on 'theorising motivations, experiences and meanings' (Braun & Clarke, 2006, p. 85) of participants in a relatively simple, straightforward fashion. The themes were identified at a semantic level, in that patterns were interpreted based upon explicit meanings evident within the data, with no attempt made to determine the underlying ideologies that inform such connotations (Braun & Clarke, 2006).

Participants

Three groups of adults took part in this research, amounting to a total of twenty two participants. Participants, recruited via an opportunity sample of students at a university in the north of England and acquaintances of the researcher, were allocated to one of the three groups depending upon their availability. Consequently, the first group consisted of ten participants whilst the final two groups comprised of six participants each. The majority of participants were well acquainted, although some were unknown to one another.

Participants' ages ranged from eighteen years old to sixty two years old, with a mean age of forty three (SD = 13.85). Twelve of the participants were male and all participants

identified themselves as being White British (with two participants not disclosing their ethnicity). All participants were eligible for jury duty in England and Wales; they were aged between 18 and 70 years, had been resident in the United Kingdom, the Channel Islands or the Isle of Man for at least five years since reaching 13 years old, were on the electoral register, had not served a prison or youth custody sentence within the last ten years (or of over five years duration at any time) and had no current or previous mental health condition or mental illness (Juries Act, 1974). In England and Wales, individuals meeting these criteria are randomly allocated to jury service without a voir dire process. Only one of the twenty two participants specified that they had previously undertaken real-world jury service. Jury service in England and Wales is mandatory.

Materials

The case was presented to participants via a twenty four minute pre-recorded video of a simulated criminal trial which took place in a replica courtroom. All actors were postgraduate students and several pilots were conducted in order to produce realistic trial materials. The video was based on that of *State v. Sukude* (2006), a serial murder case in South Africa, in which linkage analysis was admitted (and subsequently accepted) as similar fact (expert) evidence (Labuschagne, 2006; G.N Labuschagne, personal communication, November 22, 2011; Labuschagne, 2012). The defendant was charged with two counts of rape and four counts of homicide. Prosecution evidence for the first two cases included DNA evidence[1] and formal identification. Evidence from the examination and cross-examination of the victims of the first two rapes was also provided. As there was no physical evidence, victim and/or eyewitness testimony in the later offences, the prosecution presented a case

[1] Although such evidence was not present in the actual case, DNA was included as it is evidence that is unequivocally accepted by mock jurors, over and above that of other forensic evidence (Lieberman, Carrell, Miethe, & Krauss, 2008). Therefore, inclusion of such evidence would make it more probable that participants would accept such evidence as being accurate and subsequently discuss linkage analysis in greater depth. The transcripts indicated this was successful.

linkage expert witness who testified on the consistent behavioural elements within the manner and circumstances of each of the offences under examination. The defence provided their own expert who highlighted some of the current limitations attached to linkage analysis, namely; that linkage analysis research has primarily been conducted on solved cases (which inherently demonstrate greater behavioural similarity and distinctiveness), that it fails to demonstrate perfect levels of predictive accuracy and that inconclusive findings have arisen from the studies to date that specifically examine the behavioural linking of serial murders.

Both expert witnesses were cross-examined by opposing counsels. The mock jurors were instructed by the judge that the linkage evidence should only be accepted if it was believed that the similarities between offences were significant enough to infer that it was the same individual who committed the offence series. Finally, the judge instructed participants that they should deliberate for approximately one hour in order to reach a verdict for each of the six offences, whilst taking into account the principle of reasonable doubt.

Consistent with current practice in England and Wales (Law Commission, 2011), participants were provided with written copies of the judge's instructions, case details, and the linkage evidence reports prepared by the two experts in order to aid their deliberations. The case details provided a brief overview of each offence, with reference to the cause of death, the weapon utilised and any other relevant information. Such information was based upon the offence details described in Labuschagne (2006). The judge's instructions were exact replications of those delivered during the course of *State v. Sukude* (2006).

The five page prosecution linkage analysis report was based upon an unpublished linkage analysis report (G. N. Labuschagne, personal communication, November 22, 2011) presented during the course of *State v. Mogale* (2011). The report outlined the aim of linkage analysis evidence and the information sources utilised in the compilation of the report. The theoretical underpinnings of linkage analysis were conveyed, with empirical research and/or

statistics in support of such evidence provided. The two page defence expert evidence report was compiled for the purposes of this study. It centred upon the theoretical and empirical limitations of linkage analysis as judicial evidence. The report concluded that linkage analysis, at present, ought not to be admitted in court and that additional research, to address the issues previously discussed, would be necessary before any such admission.

Participant deliberations were video and audio recorded using a high-definition camcorder and a digital voice recorder respectively.

Procedure

Participants took part in the study in one of three groups. After attaining the necessary informed consent, an overhead projector was used to show the simulated trial to participants. They were informed the materials were a recreation of a genuine case and that they could take notes whilst watching. At the conclusion of the film participants were provided with written copies of the judge's instructions, case details and the two expert witness reports to read. Each jury appointed a foreperson before deliberating for between fifty and sixty minutes. The video and audio recordings of each deliberation were subsequently transcribed.

Ethics

To ensure ethical treatment of participants, all participants were informed prior to consent of the potentially distressing nature of the rape and murder cases used in the study. Participants were aware of their right to withdraw at any stage although none chose to do so. Following their participation all individuals were fully debriefed and provided with contact information for support organisations. The second author only was aware of the identity of the participants, with the first author viewing just anonymised transcripts.

Results and Discussion

In order to address the research question of how linkage analysis is regarded by jurors, thematic analysis was conducted on the verbatim transcripts of mock juror deliberations. Consistent with the guidelines set out by Braun and Clarke (2006), and in line with the epistemology of this particular research, transcripts were coded systematically for initial and final themes. A second researcher examined the annotated transcripts in order to establish the reliability of the thematic analysis. As recommended by Boyatzis (1998) memo-taking was undertaken in order that any supplementary matters of potential relevance to the themes and/or research at hand could be recorded. Both explicit discussion of the linkage analysis and linkage expert evidence, and implicit discussion of offence similarities, dissimilarities and behavioural distinctiveness dominated the discussions of all three juries. Thematic maps, constructed to visually represent the themes, illustrated little thematic differences between each of the three juries. Both researchers agreed on the existence of five themes evident across the three deliberations, which are summarised in table 1.

Insert table 1 about here

All juries reached unanimous guilty verdicts in relation to the first two offences in the series (where physical and person evidence implicated the defendant), although there were differences of opinion in the later offences in which only the linkage analysis was presented against the defendant (see table 1).

Insert table 2 about here

Theme one: Behavioural consistencies and inconsistencies

As the instructions delivered by the judge directed the mock jurors to decide whether the similarities were significant enough to infer that the same individual was responsible for the crimes, it is perhaps unsurprising that participants spent some time discussing the behavioural similarities evident across the offences in question. Whilst all behavioural characteristics identified within the linkage analysis report were discussed, the mock jurors

placed greater emphasis upon the use of a weapon of opportunity, the fact that all offences took place during hours of darkness and that all occurred within close geographical proximity to one another.

> You have got the weapon of opportunity being a rock in all four of the murder victims. And in all four cases the rock was found blood stained nearby. (P2 (J1) p. 5, 139-140)[2]

Although the mock jurors noted that there was some behavioural similarities evident across all of the offences, participants stated that they did not believe the behavioural similarities to be of sufficient likeness to one another or distinguishable from the conduct of other offenders. This is illustrated by participant 12 below.

> I don't think linkage is strong enough to say 'it was definitely that person.' Just because he's been hit in the same park with a rock. (P12 (J2), p. 18, 523-524)

As might be expected, participants discussed the conflicting behavioural dissimilarities evident across the entire offence series. Participants suggested that for linkage analysis to be considered admissible evidence the dissimilarities must be as minimal as possible (thus, the similarities are to be of far greater significance). Some participants did note that offences inherently differ and it would therefore be unrealistic to expect all offences to be entirely behaviourally consistent.

> It can be that the person adapts to circumstances as they gain experience and confidence, so that might explain some changes from the earlier to the later incidents because it might just be somebody being more confident. (P2 (J1), p. 3, 81-85)

However, the prominent view was that the disparities between the crimes were large. This view was particularly prominent within discussions of the absence of a rape victim in the final two offences, which some participants concluded to be indicative of an entirely different individual being responsible.

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[2] All participant quotes are referenced in the format; participant number, jury to which they belonged, page number and line number of the quote.

> There's been no female or no other person involved in the third and fourth case. Have they all been committed by the same person? (P13, (J2), p. 4, 119-122)

In fact, most participants concluded that the behavioural dissimilarities far outweighed the behavioural similarities, leading to the conclusion that it was not possible to accurately determine whether the same individual responsible for the entire offence series. This may explain why, with regards to the final two offences in which linkage analysis was the sole evidential material, one jury found the defendant guilty, one found him innocent and the final jury classified themselves as a hung jury. Conversely, all juries concluded that the defendant was responsible for the first two offences where DNA and formal identification evidence was present.

Theme two: Physical v. case linkage evidence

Overwhelmingly, the mock jurors accepted physical evidence to be absolute evidential material and wholly indicative of culpability. Participants often concluded, even in the initial stages of deliberations, that the mere presence of physical evidence demonstrates that the defendant must be responsible for the offences in question. In particular, DNA was considered to be the most definitive of the physical evidence and was frequently cited in participants' justifications for judgements of culpability. This coincides with American research by Lieberman, Carrell, Miethe, and Krauss's (2008) that physical evidence is viewed as extremely high-value evidential material, and therefore further supports an international CSI effect (Tyler, 2006). Similarly, Charron and Woodhams (2010) found that mock jurors in England wanted clear statistical evidence to support expert testimony on linkage analysis. Furthermore, 'preconceived beliefs about the strength and reliability of DNA evidence' (Lieberman et al., 2008, p. 32) may mean that the mere presence of DNA evidence was sufficient to render guilty verdicts. High levels of faith in DNA accuracy is exemplified below by participant 9 in the present study.

> Like linkage [analysis as evidence] alone? I don't think there is anything that could convince me. I would have said DNA as well. Which by definition and default means that, in my opinion, linkage [analysis] is obsolete. (P9 (J1), p. 14, 409-411)

In contrast to the unequivocal acceptance of physical evidence, linkage analysis was deeply scrutinised by participants with the mock jurors stating that linkage analysis did not constitute reliable and accurate evidential material. Instead, participants were hesitant about convicting an individual solely upon the basis of linkage analysis, which they saw as possibly reflecting coincidences rather than actual trends. However, not all participants were as sceptical of the value of linkage analysis as participant 9. In fact, some mock jurors, such as participant 1 below, believed that linkage analysis had merit without supporting DNA evidence if greater offence distinctiveness was demonstrated.

> I would have been swayed more by the case linkage then because of the presence of a, or the definite presence of a female, on those occasions. I don't know whether I would have hung out for physical evidence if that was the case. (P2 (J1), p. 18, 566-571)

It seems therefore that participants viewed case linkage as a form of circumstantial opinion based evidence, rather than impartial evidence based on research and expertise. This somewhat corresponds with previous American findings, in that whilst mock jurors expected circumstantial evidence to be present in nearly three quarters of all murder cases, they did not view such evidence positively or as particularly significant evidential material (Shelton, Kim, & Barak, 2007). In fact, circumstantial evidence alone was not considered to definitively show culpability, and therefore led to acquittal nearly half of the time (Shelton et al., 2007). This finding is supported in the current study as despite possessing a 'gut instinct' (P20 (J3), p. 16, 460) that the defendant was guilty, the participants generally felt that the linkage analysis alone was insufficient to accurately determine culpability. This caused participants

difficulty in reaching a guilty verdict in the two offences which lacked physical evidence, a trend also witnessed in prior research (Shelton, 2008).

> Turning things around, if it was you being convicted, would you be happy to be convicted based on completely uncorroborated circumstantial evidence? Where there is no DNA, nobody identified you as doing the crimes, there is no actual physical evidence of you doing it. (P3 (J1), p. 21, 660-666)

The suggestion that the linkage analysis is 'just circumstance' (P19 (J3), p. 34, 1002-1004) indicates that participants did not believe the linkage analysis to be strongly indicative of the defendant's guilt. However, it was not made apparent to the participants that the linkage evidence was presented as expert opinion that the evidence strongly implied 'that the defendant was likely to be guilty of whatever was currently alleged against him' (Allen, 2008, p. 319) rather than as evidential material demonstrating definitive culpability. These findings therefore imply that without specific instruction regarding the use of linkage evidence as supporting evidence rather than definitive evidence of guilt, the participants may have misused the linkage evidence in their deliberations.

Theme three: Barriers to admissibility

Whilst both expert witnesses discussed empirical research within their testimonies, mock jurors placed more emphasis on the defence expert's critique of linkage analysis than the prosecution expert's, perhaps as it reaffirmed their stance on linkage analysis as evidential material. Several barriers to admissibility were discussed by participants; the lack of empirical support for linkage analysis, lack of real world experience held by academic experts, researcher errors and expert/researcher impartiality.

Several perceived barriers to case linkage evidence admissibility focused upon the integrity of academic researchers, supporting prior findings of juror scepticism towards

linkage analysis experts (Charron & Woodhams, 2010). Although the linkage analysis experts were praised for using case studies and having conducted a thorough examination of the offences, participants were sceptical of the value of academic research being applied to real life investigations.

> I mean my fear is this Gillian Roberts [author of the linkage analysis report], she says she has worked with the police and stuff beforehand. My fear is that she lives in an academic world where she sits in an office all day and says this, that and the other… and that she hasn't really got that much experience of real life. (P9 (J1), p. 16, 485-489)

Perhaps emphasising that the expert evidence was provided to illustrate similarities between offences rather than the defendant's culpability, may go some way to alleviate the above concern. Additionally, participants may have placed such great value on experts gaining real-world experience as they believed that empirical research findings could be inaccurate and misleading. Participants were certainly concerned that by using solved crimes to develop and test the accuracy of linkage analysis (Woodhams & Labuschagne, 2012) researchers could essentially 'pick and choose…to make it suit' (P9 (J1), p. 18, 538-539) their personal agenda. In fact, participants expressed doubts regarding whether expert witnesses could ever be impartial given that they were paid by the court for their work.

> I think you could, if you picked any three or four murders and listed out items you could link anything really and say well that's the same and that's the same. (P3 (J1), p. 16, 492)
>
> The problem with [expert] witnesses is…they make their money. (P17 (J3), p. 11, 305-306)

This somewhat sceptical viewpoint of the expert witness is supported by Ivkovic and Hans (2003), who demonstrated that the expert themselves is just as important, if not somewhat more important, than the evidence itself. However, experts in England and Wales are required by both the courts (Crown Prosecution Service, 2010) and their professional body (British Psychological Society, 2010) to provide impartial evidence in court. Therefore,

by highlighting this fact to jurors internationally, scepticism of perceived 'gun for hire' experts (Devine et al., 2001) may be decreased.

The potential for data falsification and misrepresentation was not suggested to participants in the case materials, but some participants still expressed concern that data may be deliberately falsified.

> Just because there's studies been done, it doesn't mean that these studies are viable. You get loads of things that can be printed and published and they can be absolute codswallop. (P19 (J3), p. 21, 622-624)

Concern over this issue could therefore reflect a widespread unease over psychological research integrity following recent falsified academic data scandals (Jarrett, 2013). Laws (2013) suggests that the scientific disciplines in general tend to publish significant findings more often than non-significant findings (on the basis that the former make a greater contribution to knowledge), which may promote data manipulation or falsification. However, more widespread publishing of both significant and non-significant research findings and more transparency in the reporting of data collection and analysis may somewhat alleviate this issue (Laws, 2013). This would also further address the prominent concern amongst participants regarding the absence of a large catalogue of research supporting the use of linkage analysis. In fact, Woodhams, Bull, and Hollin (2007) and Woodhams, Hollin, and Bull (2007) acknowledged that the relative scarcity of empirical research regarding the veracity of linkage analysis, and the variety of techniques used in prior research, posed a barrier to its more widespread acceptance. However, a recent increase in published research on this issue (Bennell, Mugford, Ellingwood, & Woodhams, 2013) could somewhat alleviate this concern. Nonetheless, further research into the accuracy of linkage analysis may allow a body of supportive literature for the various techniques involved to be established, and thus assist in allaying concerns over its scientific rigour and accuracy. Thus,

in general this theme suggests that opinions of experts and research must be raised before linkage analysis can play a more prominent role in juror decision making in England and Wales and elsewhere.

Theme four: Potential uses of linkage analysis

Although participants questioned the reliability and accuracy of case linkage analysis (see theme 3) they did not dismiss such evidence entirely. Instead, participants offered several suggestions regarding how case linkage could be improved and used in future.

Sub-theme one: Offences of greater similarity and distinctiveness.

Participants often stated that, had the series of offences been of greater similarity to one another and/or distinguishable from the offences of others, perhaps linkage analysis would have been of greater influence upon deliberations and subsequent verdicts. Thus, the mock jurors suggested linkage analysis should only be applied to crimes of noteworthy similarity and/or distinctiveness.

> In a separate, totally different case I might think 'yeah there's treble the amount of links and stuff' and yes in that case, the case linkage itself might be viable to use. So we're not writing that off altogether. (P19 (J3), p. 27, 802-805)

However, participants' dependence upon lay knowledge as to the commonality of offence characteristics may bias their assessments of what constitute appropriate cases. Furthermore, perhaps jurors are unrealistic as to their expectations of criminal behaviour, particularly when discussing the timing of the various offences.

> I mean they're quite spread about, it's maybe a year apart for these four, could you wait a year to kill somebody again? Is that what he's waiting for, to get his buzz? (P12 (J2), p. 21-22, 649-650)

It seems participants believe that in order for the offences to be deemed of sufficient similarity to one another, they must occur regularly within a relatively short period of time.

However, serial murderers are offenders that have '. . . killed three or more victims over a period of days, weeks, months or years. . .' (Hickey, 1997, p. 12), clearly showing that offences can occur over an extended period of time. If participants were better informed as to patterns of actual criminal behaviour (both in general terms and specifically related to the offences in question) perhaps linkage analysis could have a greater influence upon deliberations. Moreover, participants did not consider that additional undetected offences could have been committed by the offender in the intervening non-offending periods of time.

Sub-theme two: Concurrent with physical evidence.

The mock jurors placed emphasis on the accuracy of physical evidence. In fact, they expressed the stance that linkage analysis, as evidential material in legal proceedings, should only be admitted when presented alongside additional evidence (particularly physical evidence). Participants often stated that only then could linkage analysis evidence be considered in anyway admissible.

> You can't use it as a single aspect of being able to prove guilty or not guilty. It's got to be used in conjunction with some other type of evidence. (P3 (J1), p. 2, 43-44)

Participant's desire for corroborating scientific evidence in the current study, and their view of physical evidence as definitive and infallible evidence of culpability, demonstrates support for the CSI effect. However, given that DNA evidence is often seen as definitive evidence of guilt on its own (Tyler, 2006), it is questionable whether linkage analysis would actually be of additional practical value to cases with DNA traces to connect the defendant to all offences in a series of seemingly linked crimes. Nevertheless, the participants were clear that linkage analysis could be considered somewhat acceptable when accompanied by additional evidential material, and add to the body of evidence against that individual.

Sub-theme three: Proactive case linkage.

Woodhams, Bull, and Hollin (2007) define reactive case linkage as the use of linkage analysis as a 'reactive search…based upon an index offence…to identify other crimes potentially committed by the same offender' (p. 119). In contrast, proactive case linkage involves a search for potentially linked offences amongst unsolved cases. Although participants were obviously unfamiliar with the correct terminology, they did suggest that proactive case linkage may be an appropriate use of linkage analysis.

> I think it's probably used better, it shouldn't be used in court really, it should be used to help the police in the first instance saying 'we are looking for one person, we still don't know who that person is, but we are looking for one person'…it's probably better for them tracking someone down. (P9 (J1), p. 2, 49-52)

This suggestion from participants is consistent with the present use of such evidence in England and Wales, with Woodhams, Hollin, and Bull (2007) reporting that linkage analysis evidence is applicable to the more recent intelligence-based format of policing. Therefore, although participants did not see linkage analysis as reliable enough to be useful in court, they did envisage some value to linkage analysis as a tool in the investigation of crime.

Theme five: Dependence on lay knowledge

Ormerod and Sturman (2005) noted that, for linkage analysis to be considered admissible expert evidence, it must first be deemed that the information presented is beyond the understanding of an average individual. Although not explicitly stated, the admittance of such evidence in *State v. Sukude* (2006) implies that the behavioural characteristics and similarities evident would only be identifiable by an individual with 'psychological expertise' (Ormerod & Sturman, 2005, p.188). However, this viewpoint was not shared by the majority of participants.

Participants stated that the behavioural characteristics of the offence, in particular the choice of weapon, were not sufficiently distinct for the linkage analysis to be of value. The

mock jurors believed that a rock (the weapon in all the offences) was too easily accessible and too common a weapon to suggest that a single offender was responsible for all offences. Instead, they suggested that a specific type of gun or a rare type of knife involved in all offences would offer much greater discrimination, and therefore stronger indication that the same offender was responsible for the series of offences. This is in direct contrast to the statistics on the use of a blunt object in homicide offences (although not specifically that of a rock), which demonstrate that, in the country of origin for *State v. Sukude* (2006), the use of such a weapon accounted for approximately 24% of all fatalities, far below that of firearms and sharp instruments (Meel, 2004). Although this statistic is perhaps elevated by South Africa's high crime rate (Labuschagne, 2007), blunt object use only accounts for a similarly low proportion of (9%) all homicide offences in England and Wales (Brookman, 2005) where the study took place. Thus, it is perhaps appropriate to infer that in the absence of empirical research and statistics to suggest otherwise, participants relied on their (flawed) lay knowledge as to the commonality of weapons present within homicide offences.

The media were cited as the foundation of participants' knowledge and understanding of the criminal justice system. Reference to newspapers, televised news broadcasts and crime documentaries, as well as fictional films and dramas were made by participants.

> I mean we've got a big gap [in offence occurrences] but the trouble is you've seen that many crappy serial killer films where they sit there and go 'well the periods of attacks are getting closer'. That's kind of in the back of your mind as well. (P22 (J3), p. 15, 440-442)

The suggestion that there are many copycat crimes was often made in an attempt to explain the behavioural dissimilarities across the entire series. For example, the absence of sexual assault and the removal of the victim's clothing and personal items in the third and fourth offences were suggested as indicative of a copycat committing the latter offences. The mock jurors believed copycat offenders to be relatively frequent, yet the anecdotal empirical

research on copycat crimes illustrates that they occur extremely infrequently and tend to be limited to existing juvenile offending populations with relatively minor criminal offences (Surette, 2010). Perhaps if participants had been informed of the actual prevalence of copycat crimes they would not have been as quick to suggest this as an explanation for the dissimilarities between the offences and the reliability of the linkage analysis would have been more readily accepted.

Participants also relied on their existing knowledge when considering whether there was a sexual element to the third crime in the case. In the first two offences, the male victims were engaged in sexual intercourse with a female when they were attacked and, after hitting the male victims over the head with a rock, the females were raped. Despite the apparent lack of female rape victims in the third and fourth offence, the victim's lack of trousers (offence three) and shoes (offence three and offence four) was suggested by the prosecution expert as consistent with a sexual theme in all of the offences. However, participants stated that the linkage analysis was reliant upon assumptions in assigning the lack of trousers to the category of sexual behaviour, and had not considered in-depth alternative explanations. They proceeded to discuss at length alternative reasons for the victim's trousers being absent from the crime scene. These suggestions included trophy taking, the victim misplacing their trousers and theft by someone other than the offender.

> Yeah that one's… But the third one he's lost his trousers and a shoe, why? It could be, as we said, it might have been the sexual side to it. But the other one is, how did he lose it? Was it taken by the murderer? Or was it taken by someone else who came across the body? A vagrant, I don't know. I mean this is one of the things, you don't know what's… (P17 (J3), p. 4-5, 115-118)

Alternatively, participants could have misunderstood the expert evidence regarding the lack of clothing in the later offences. Some participants assumed the expert to have suggested that the missing trousers in offence three demonstrated that the offender had raped

the male victim. However, as discussed above, the sexual theme actually referred to not only the rape of female victims in the first two offences, but also the fact that the offender apparently targeted victims who were having sexual intercourse. However, any misinterpretation of the expert evidence was not widespread as some participants reflected the expert view that female rape victims may have failed to report their victimisation to the police in the later incidences.

> Yeah but not everyone reports rape do they? There is quite a high percentage of women who don't go to the police about it. So there could have been female victims involved, we just don't know about it. (P1 (J1), p. 1, 30-32)

Overall, this theme supports the stance that, if participants had been better informed as to the distinctiveness of offence behaviours more reliably informed discussions and deliberations could occur. Furthermore, the theme provides support for the disputed notion that viewing CSI-type television dramas affects juror decision making (Baskin & Sommers, 2010; Call, Cook, Reitzel, & McDougle, 2013; Hayes-Smith & Levett, 2011).

The general conclusion that can therefore be inferred from these findings is that offence behaviours are not accurately identifiable by jurors (Woodhams, Bull, & Hollin, 2007; Charron & Woodhams, 2010) and thus case linkage evidence meets the necessary criteria for admittance into court in England and Wales. This strengthens the argument for the legal admissibility of linkage analysis in trials around the world (Woodhams, Bull, and Hollin, 2007). On a positive note, this theme suggests that just as expert testimony on psychological issues such as eyewitness accuracy (Devenport & Cutler, 2004; Devenport, Stinson, Cutler, & Kravitz, 2002; Hosch, Beck, & McIntyre, 1980), false confessions (Blandón-Gitlin, Sperry, & Leo, 2011) and child abuse victim credibility (Goodman-Delahunty, Cossins, & O'Brien, 2011) can reduce juror's biases, expert evidence regarding the real world accuracy and frequency of techniques and trends relevant to linkage analysis will help to correct juror's inaccurate assumptions on this topic.

Multiple offences

Whereas case linkage actively encourages jurors to consider various offences together, there are clear similarities to the concept of joined cases in the USA. The time and costs associated with multiple trials are decreased when separate charges against a defendant are joined in a single trial. Although jurors are directed to consider each charge separately, trying offences together actually increases the likelihood of guilty verdicts compared to the same offences being tried separately (Greene & Loftus, 1985; Tanford & Penrod, 1982). The grouping of charges negatively affects perceptions of the defendant's likeability and believability and increases evaluations of their dangerousness (Greene & Loftus, 1985). Just as judicial instructions are ineffective at reducing negative biases from pre-trial publicity and inadmissible evidence (Bornstein, Whisenhunt, Nemeth, & Dunaway, 2002; Cook, Arndt, & Lieberman, 2004), bias is not removed by judicial instructions to consider the charges in joined cases separately (Greene & Loftus, 1985). Although similar instructions would obviously defeat the purpose of case linkage evidence, these findings clearly suggest that, irrespective of the impact of the linkage evidence itself, guilty verdicts may be more readily reached in trials involving case linkage due to the multiple offences considered. However, this finding was not witnessed in the current study as guilty verdicts were unanimously returned for only two of the four charges against the defendant. It therefore appears that juror scepticism of linkage analysis was sufficient to counteract the negativity bias that multiple charges in joined cases can create. This may be a result of the lack of direct evidence linking the defendant to these later offences. Thus, there is clearly a need for future research to consider whether defendants are disadvantaged in trials involving case linkage and how any such bias could be overcome. This aim could be achieved by comparing the decision making of mock jurors exposed to either a defendant charged with a single offence, or the same

defendant charged with further offences connected to the original offence solely by linkage analysis.

Group dynamics

Groupthink is the impairment of decision making processes that can occur within highly cohesive groups (Janis, 1972). In the case of jurors, groupthink can lead to poor evidence evaluation and inappropriate verdicts being reached. With the exception of Peoples, Sigillo, Green, and Miller (2012) the effect of prior relationship between mock jurors has not been directly assessed, although a relationship between mock jurors is likely within studies utilising student samples and the current study which utilised a mixture of close acquaintances and strangers. Despite the potential presence of some groupthink antecedents (such as prior friendship and group isolation whilst deliberating), the current study transcripts demonstrate no evidence of conformity or of any of the eight symptoms of groupthink (Janis, 1983). In fact, all three juries who showed signs of higher level reasoning, such as encouraging alternative hypotheses and expressing doubt over the offender's guilt (Kuhn et al., 2004), rather than signs of conformity and groupthink. In support of this, Peoples, et al. demonstrated that although distant friendships increased the likelihood of jurors conforming to acquittal, close friendships actually decreased conformity. Furthermore, the lack of consensus in all three juries with regards to two of the four offences with which the defendant was charged indicates that their prior relationship did not adversely affect the participants' deliberations. Therefore, the prior relationship between participants does not appear to have unduly influenced the study findings, although future research is required in order to investigate this further.

Conclusion

This research aimed to increase understanding of how jurors regard linkage analysis as evidential material within the context of deliberations. It specifically considered 'how do mock jurors perceive linkage analysis evidence?' Participants deliberated over a simulated trial based on an actual case which embedded linkage analysis with other contextual case information and evidence. The analysis revealed high levels of scepticism directed towards linkage analysis evidence and experts on this topic. This is an important finding as this type of evidence has already been successfully admitted into evidence in South Africa (*State v. Sukude*, 2006; *State v. Mogale*, 2011) although it should be noted that regulations regarding evidence admissibility differ between South Africa and England and Wales. The findings of the current study suggest that linkage analysis expertise could aid juror decision making (Ormerod & Sturman, 2005) when presented in court alongside other case evidence, and would be accepted by jurors in England and Wales as a valid investigative tool leading to the apprehension of the defendant. Better educating participants regarding the empirical research and/or statistics underpinning the technique, could potentially correct inaccurate perceptions regarding copycat crime frequency (Surette, 2010), lessen cynicism of linkage analysis (Charrons & Woodhams, 2010) and reduce mock jurors' desire for corroborative DNA evidence. Moreover, explaining to jurors at the outset that linkage analysis is presented as expert opinion rather than definitive evidence of guilt may help counteract some biases. However, as research on juror evaluations of linkage analysis is still developing, the efficacy of this suggestion, as well as the amount, type and timing of supplementary information necessary to overcome juror scepticism of this type of evidence is currently unknown. It is important therefore to conduct experimental research to assess the impact on deliberations of these variables if linkage analysis is to become legally admissible in countries other than South Africa. This could be achieved through systematically manipulating the expert evidence with regards to copycat crimes (present v absent) v statistical offence behaviour

frequencies (statistics v no statistics) and the purpose of linkage analysis evidence (description of similar fact evidence v no description) within realistic simulated trial footage, and assessing resulting mock juror verdicts and evidence evaluations.

Despite their scepticism, mock jurors did not dismiss linkage analysis entirely; instead they suggested that linkage analysis could be useful in reactive policing and in cases of greater behavioural similarity and distinctiveness. This supports Paclebar et al's (2007) assertion that profiling evidence (including linkage evidence) 'can be judged as strong if it accompanies a strong case or judged as weak if it accompanies a weak case' (p. 259). In conclusion, whilst the findings support those of Paclebar, Myers, and Brineman (2007) and Charron and Woodhams (2010) (although more so the latter), they have also expanded understanding of the impact of evidential linkage analysis upon deliberations and provided new avenues for research. Moreover, the current research suggests that modern linkage analysis meets the criteria to be legally admissible in England and Wales on the grounds that it is not within the understanding of a layperson (Woodhams, Bull, & Hollin, 2007) as evidenced by the participants' frequent misconceptions. Further empirical research and/or statistics are required to address the issues highlighted within this research, and consequently to remove the barriers to the acceptance of linkage analysis evidence in the courtroom.

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Table 1: Themes and sub-themes in the jury deliberations

	Theme and subtheme
1	Behavioural consistencies and inconsistencies
2	Physical v. case linkage evidence
3	Barriers to admissibility
4	Potential uses of linkage analysis
a	Offences of greater similarity and distinctiveness
b	Concurrent with physical evidence
c	Reactive case linkage
5	Dependence on lay knowledge

Table 2: Jury verdicts for each offence in the series

	Verdict			
Jury	Offence 1	Offence 2	Offence 3	Offence 4
1	Guilty	Guilty	Not guilty	Not guilty
2	Guilty	Guilty	Not guilty	Not guilty
3	Guilty	Guilty	Hung jury	Hung jury